

INTERLOCKING COMPONENT ASSEMBLY SYSTEM

Background of the Invention

1. Field of the Invention

[0001] The present invention relates to a flat panel/frame assembly of structural multi-sided units which can be assembled to form various industry products, and more particularly, to a method of assembling the multi-sided flat panel/frame cube units without additional, separate fasteners.

2. Description of the Related Art

[0002] Precision assembly systems (P.A.S.), ready-to-assemble (R.T.A.) and knocked down (K.D.) methods for manufacturing, constructing and assembling square, multi-sided or rectangular cube based products are known. One disadvantage with the known methods is that ease for assembly/disassembly is low, often requiring numerous fasteners, tools and personnel to complete the project. Furthermore, even if the number of fasteners is minimal with such assemblies, the mere presence of fasteners decreases the aesthetics of the completed product.

[0003] More often than not the fasteners are specially-configured which may or may not meet local safety requirements. If one fastener is missing or broken, assembly must be discontinued until a replaced fastener can be obtained. Thus, the use of separate fasteners increases assembly time, costs and frustration for the user/assembler.

[0004] U.S. Patent Nos. 1,735,375, 2,620,251, 2,651,557 and 4,691,644 each disclose a frame structure which can be assembled of horizontal and vertical members. However, these frame structures require that the assembled members be fixed together with fasteners. Hence, the ease of assembly is decreased due to cost, time and effort expended by the user/assembler.

[0005] In order to overcome the deficiencies related to P.A.S., R.T.A. or K.D. methods utilizing fasteners, numerous alternative fastener-free products have been developed. U.S. Patent No. 4,482,074 to Lalley discloses a multipurpose container of a foldable body blank having a plurality of slots to receive lugs of first and second head members. Although the container can be assembled without separate fasteners, the cooperative mounting means are complicated and the pieces are not interchangeable. Moreover, each container is

independent and although numerous containers can be stacked, no means are provided for fastening a plurality of containers together to build a unit.

[0006] U.S. Patent No. 4,171,150 and British Patent No. 942,739 each disclose a storage cabinet consisting of a plurality of components which can be assembled by a plurality of engageable members. However, like the patent to Lalley, the structure of the engaging members is different for the sides and top members.

[0007] It is desirable to have P.A.S., R.T.A. & K.D. manufacturing and assembly methods which reduce the need for separate fasteners, but at the same time allow for a simple and quick interlocking manufacturing, construction and assembly manner.

SUMMARY OF THE INVENTION

[0008] One object of the present invention is to provide an interlocking flat panel/frame manufacturing, construction and assembly process that requires no additional, separate mechanical connection devices or fasteners.

[0009] Another object of the present invention is provide method for the manufacturing, construction and assembly of structural multi-size, multi-sided square and/or rectangular cube units that can be utilized to construct and assemble an unlimited number of products in any industry.

[0010] Yet another object of the present invention is to provide an interlocking flat panel/frame manufacturing, construction and assembly process that requires few non-or minimally-trained persons for assembly.

[0011] Still another object of the present invention is to provide an interlocking flat panel/frame which allows for simple and quick assembly at either a manufacturer's primary or secondary facility or at a customer's field location.

[0012] The interlocking flat panel/frame of the present invention is capable of receiving a plurality of different subassemblies, such as shelving, drawers, doors, dividers etc., to construct functional product units that can be designed to meet various market and industry requirements.

[0013] Although the interlocking flat panel/frame product of the present invention embodies the P.A.S., R.T.A. & K.D. manufacturing and assembly methods, when final assembly is completed no unsightly connectors or fasteners which would detract from the aesthetics of the completed product are visible.

[0014] Another advantage of the interlocking flat panel/frame manufacturing, construction and assembly process of the present invention is that freight and transportation

costs, warehouse and storage costs, and floor turn rate are reduced. These costs can be reduced by up to 80% versus conventional product unit factory manufacturing and construction methods. These cost reductions have no effect on the industry functional, aesthetic, or international industry safety standards of the finished product.

[0015] An additional and significant advantage of the present invention is that various connecting methods, concealed or exposed, can be utilized to meet different market manufacturing, construction and assembly processes. Moreover, the interlocking flat panel/frame manufacturing, construction and assembly process of the present invention can reduce component inventory levels by up to 70% depending upon the product unit type. Other associated business inventory investment costs can be reduced by utilizing common components to construct various industry unit products.

[0016] In accomplishing these and other objects of the present invention, there is provided an interlocking component assembly comprising a plurality of frame components and a plurality of panels, wherein each panel formed integrally with a respective frame to form a frame and panel component. Means interconnect a plurality of the assembled frame and panel components together. The interconnecting means comprise a channel formed along the entire periphery of each of the frame/panel components. During assembly the channel of a frame/panel component is inserted within a channel of another frame/panel component to lock the components together along the length thereof.

[0017] The size of a unit made according to the present invention depends upon the height, width and depth of the frame and panel components. The unit can be prepared to accept any one or more of a plurality of sub-components.

[0018] These and other objects, features, aspects, and advantages of the present invention will become more apparent from the following detailed description of the preferred embodiment relative to the accompanied drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Fig. 1 is an expanded, isometric view of a flat panel/frame unit according to the present invention.

[0020] Figs. 2A-2D are perspective views of the interlocking flat panel/frame components of the present invention.

[0021] Fig. 3 is a cross-sectional view of the assembled flat panel/frame unit taken along line I-I of Fig. 1.

[0022] Figs. 4A and 4B are cross-sectional views illustrating the assembly process of the interlocking frames according to the present invention.

[0023] Fig. 5 is a perspective view of another embodiment of an interlocking flat panel/frame unit assembled according to the present invention.

[0024] Fig. 6 is a cross-sectional view of the assembled flat panel/frame unit taken along line II-II of Fig. 5.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0025] Referring to Fig. 1, a plurality of vertical interlocking flat panel/frame components 10, 12, 14 and 16 and horizontal interlocking flat panel/frame components 18 and 20 can be assembled to form an interlocking flat panel/frame unit according to the present invention. It should be appreciated that a variety of multi-sided or rectangular/square units can be assembled according to the present invention, with the specific shapes and sizes of the units being dictated by industry or customer requirements.

[0026] As shown in Figs. 2a-2c, each vertical or horizontal component comprises an interlocking frame 12a, 18a and an integral flat panel 12b, 18b respectively. The panels and frames can be made of a variety of material, such as, metals, plastics, etc. The choice of material is dependent upon the industry (ANSI/BIFMA) requirements, as well as customer requirements such as function, cost, price point, etc. The frames 12, 18 are a unitary-channel shaped construction as described further herein. It should be appreciated that the interlocking components can be comprised of only the interlocking frames and not the integral frame/panel support.

[0027] Referring to Fig. 3, flat panel 14b is integral with frame 14a and the flat panel/frame units can be a portion with a skin surface as shown in Fig. 3.

[0028] Figs. 4A and 4B illustrate a method of interlocking the frame/panel components to form the units according to the present invention. As shown in Fig. 4A, each of the frames are formed of an approximately U-shaped channel which extends along the entire circumference of the frame. The channel includes a first leg portion 30 having a lip 31 extending perpendicularly from a first end of the channel. A base portion 32 connects first leg portion 30 with a second leg portion 34.

[0029] Leg portion 34 includes a locking tab 24, although only locking tab is shown it should be appreciated that the channel can include a plurality of locking tabs positioned on either leg portions 30, 34 or base portion 32. The actual number and position of the locking tabs on the frames depend upon the customer/industry requirements. Locking tabs 24 are

designed to be received within respective apertures 26 also located on the frames, as shown in Fig. 4B. Like tabs 24, the number and positioning of apertures 26 depend upon customer/industry requirements.

[0030] As shown in Figs. 4A and 4B, frame 18 is inserted into frame 12 at an angle, indicated by the arrow in Fig. 4A, so that the two frames interlock at, for example, a 90° angle. It should be appreciated that other connection angles are contemplated by the present invention. Frame 18 is then rotated upward into frame 12 until locking tab 24 is engaged within aperture 26. No other devices or fasteners are required to assemble the interlocking flat panel/frame unit according to the present invention. As shown in Fig. 4B, when assembled second leg portion 34' of frame 18 extends flush with base portion 32 of frame 12 to form an almost seamless connection between frames 12 and 18.

[0031] Referring to Fig. 5, another embodiment of an interlocking frame/flat panel unit is shown. The unit includes vertical interlocking flat panel/frame components 10', 12' and 16' and horizontal interlocking flat panel/frame components 20'. A plurality of subcomponents are incorporated in an assembled unit. For example, the cube unit can include a drawer 40, tub 42 or another type of tray unit. A shelf 44 and divider 46 can also be incorporated in the unit. The actual finished design and shape of a cube unit is dependent upon customer/industry requirements. For example, shelf 44 can be of a variety of widths, lengths and depths, fixed within the unit or of adjustable locations. The shelf could also be slidable in and out of the unit by incorporating slides or runners on the vertical/horizontal panels.

[0032] The units could also incorporate frame(s) (not shown) of a variety of sizes and load capacities, either fixed or adjustable, and slidable within the unit. Drawer 40 could also incorporate file suspension devices of various sizes, materials and functions. All of the components, as well as the frames/panels can be made of a variety of materials and finishes. The unit can also incorporate a door (not shown) having a variety of designs. For example, the door could be of a louver design, a single or double swing door design, either left-side or right-side mounted. Also, the present invention contemplates a door of a rolling shutter or sliding design. Locking assemblies of a variety of types and specifications, i.e., having a single or multiple locking points, can be incorporated in an assembled unit.

[0033] Fig. 6 is a cross-sectional view of the unit of Fig. 5 taken along line II-II thereof. As shown, frame 10a' and integral flat panel 10c' can be assembled with a frame 16a' and panel 16b' of second frame/panel unit. Likewise, frame 12a' can be assembled with frame 16a'. Each frame unit has locking tab(s) and aperture(s) as described herein above.

[0034] Referring once again to Fig. 1, the procedure or method for assembling the unit thereof will be described. Vertical flat side panel/frame components 10 and 12 can be attached to vertical front and back flat panel/frame components 14,16 by interlocking the frames as described above with relation to Figs. 4A and 4B.

[0035] Thereafter, each of the horizontal panel/frame components 18 and 20 can be attached to front panel 14 of the assembled vertical components and rotated into position to connect with side vertical frame/panels 10, 14 and back vertical frame/panel 16 to form a three-dimensional multi-sided shaped unit. The assembly sequence can vary from product to product. However, one example of an attachment sequence would be to assemble the side panel/frame units to front and back flat panel/frame units. Next, the top and bottom panel/frames could be interlocked with the front of the product and then rotated into position with the side and back panel/frames.

[0036] To prevent twisting or deforming of a frame cross-section of an assembled cube unit, after the materials, size and subcomponents of a unit are selected, the number and location of the locking tabs and holes are established. Thus, the number and location of the locking tabs are determined after a specific product with its unique performance specifications has been established.

[0037] In summary, the interlocking panel/frame assembly and method thereof allows for a plurality of multi-sided sized units, made of a variety of materials, and having an infinite number and choice of sub-components. The finished units being dictated solely by customer/industry requirements.

[0038] Although the present invention has been described in relation to particular embodiments thereof, many other variations and modifications and other uses will become apparent to those skilled in the art. It is preferred therefore, that the present invention be limited not by the specific disclosure herein, but only by the appended claims.